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Spruce Budworms Situation in North America 1985

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Spruce Budworms Situation in North America 1985

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Introduction

Several species of spruce budworms (Choristoneura spp.) feed on the immense forests of balsam fir, Douglas-fir, true firs, and spruce that cover North America. Each year, budworm larvae defoliate many thousands of hectares.

This annual report contains information about spruce budworms conditions in Canada and the United States during 1985. These data are organized by Province, State, or Forest Service Region and summarized in the tables and maps at the end of the report. Table 1 and figure 1 show hectares defoliated; table 2 and figure 2 hectares treated. All values in the tables have been rounded off to the nearest thousand.

Overall, defoliation caused by the spruce budworms increased. In the Eastern United States and Eastern Canada, the area defoliated increased from 23.3 million ha in 1984 to 25.3 million ha in

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1985. In the Western United States and Western Canada, the area defoliated increased from 4.5 million to 5.0 million ha.

Drought conditions throughout much of Eastern Canada and parts of Western North America, especially during June and July, may have favored the insects. Defoliation increased in Nova Scotia, Prince Edward Island, New Brunswick, and Ontario. It also increased in British Columbia, Idaho, Montana, Oregon, Washington, and Wyoming.

Defoliation declined, however, in New England, in parts of the Lake States, and in Quebec, Newfoundland, and the Prairie Provinces. Nevertheless, mortality continued where trees were once again defoliated or could not recover from past defoliations. At high elevations (over 750 m), the spruce beetle (Dendroctonus rufipennis (Kirby)) also caused considerable mortality in some budworm-weakened red and black spruce stands in New England.

Suppression projects were carried out on 1.8 million ha in 1985, down from 2.5 million ha treated in 1984 and 3.5 million ha treated in 1983. Newfoundland, Nova Scotia, New Brunswick, Quebec, and Ontario carried out suppression projects on 1.5 million ha. No major suppression projects were conducted in Western Canada. In the United States, about 0.3 million ha--in California, Colorado, Maine, Michigan, New Mexico, and Oregon--were treated.

In 1985, the overall use of the biological insecticide Bacillus thuringiensis (Bt) increased. This increase may be partly due to the unavailability of the insecticide mexacarbate. Production of mexacarbate is expected to return to normal in 1986.

Further information is available from the USDA Forest Service, Northeastern Area, State and Private Forestry, 370 Reed Road, Broomall, PA 19008, or from the Forest Insect and Disease Survey, Canadian Forestry Service, 19th Floor, Place Vincent Massey, Ottawa, ON K1A 1G5.

Situation in 1985

Eastern Canada

Newfoundland--The area defoliated by the spruce budworm (Choristoneura fumiferana (Clemens)) decreased dramatically to 3,500 ha in 1985. Of this, only 400 ha were moderately to severely defoliated. Preliminary surveys indicate that the volume of timber lost did not increase greatly on the 485,000 ha with dead and dying trees recorded previously.

The Department of Forest Resources and Lands used Bt to treat 3,450 ha in 1985.

Nova Scotia--The area defoliated in 1985 covered 345,255 ha, compared to 85,000 ha in 1984. Most of the defoliation was moderate to severe, but defoliation was light on 26,394 ha.

The Department of Lands and Forests treated 49,720 ha and the J.D. Irving Company treated an additional 2,800 ha in 1985. They used a single application of Bt on all areas.

Prince Edward Island--The area of defoliation increased more than fourfold to 70,100 ha in 1985.

New Brunswick--Moderate to severe defoliation occurred on 1.07 million ha in 1985, an increase from the 730,000 ha defoliated in 1984. This is still less defoliation than has occurred in recent years.

Forest Protection Limited treated about 701,000 ha. They used aminocarb on 452,000 ha, fenitrothion on 168,000 ha, and Bt on 81,000 ha.

Quebec--The area defoliated decreased from 11.04 million in 1984 to 9.27 million ha in 1985. Defoliation was light on 2.98 million ha, moderate on 0.81 million ha, and severe on 5.48 million ha.

The Ministry of Energy and Resources treated 665,685 ha, mainly in the lower St. Lawrence and Gaspe areas. They applied Bt on 481,230 ha and fenitrothion on the remaining hectares: in short, they used Bt on over 70 percent of the hectares treated. Quebec plans to eventually rely entirely on this insecticide.

Ontario--The area of moderate to severe defoliation increased from 8.7 million ha in 1984 to 12.3 million ha in 1985. Defoliation declined in northeastern and southern Ontario but increased significantly in north-central and northwestern Ontario. The areas within which tree mortality occurred increased to 13.9 million ha.

The Ministry of Natural Resources used Bt on 29,000 ha in 1985. This area included commercial forests, parks, plantations, and a moose yard.

Prairie Provinces

The spruce budworm caused moderate to severe defoliation on 106,000 ha in 1985--a decrease from the 170,000 ha defoliated in 1984. Most of the area defoliated (77,000 ha) was in Manitoba; the rest (29,000 ha) was in scattered small pockets in Alberta and Saskatchewan.

Eastern United States

New England--The area defoliated declined in 1985; almost all the defoliation was recorded in Maine, where 1.9 million ha were defoliated. In the area defoliated, 486,000 ha were moderately to severely defoliated. Since the 1982 outbreak, when 3.2 million ha were defoliated, the budworm

population has declined steadily in Maine and is now at its lowest level since 1973. However, over 50 percent of the balsam fir on 121,000 ha has been killed by the spruce budworm; in 1985, over 10 percent of the balsam fir on a further 284,000 ha also died.

The Maine Forest Service treated 166,430 ha of spruce-fir in 1985. They used Bt on 134,227 ha and mexacarbate on the remaining 32,203 ha. The budworm population declined for the third year in a row.

In addition, the Forest Service cooperated with Maine's Passamaquoddy Tribe in treating 2,728 ha with Bt. The Forest Service also cooperated with Loring Air Force Base in treating 567 ha with Bt.

Finally, the J.D. Irving Company treated approximately 69,222 ha with aminocarb. Other private organizations and the University of Maine also treated about 1,000 ha with Bt.

Budworm populations in New Hampshire and Vermont declined to near endemic levels, and no defoliation was detected during aerial surveys. Further population declines are expected. Vermont now estimates this year's spruce-fir mortality at 35,000 m^3 versus 226,000 m^3 in 1984.

For the first time in recent years, New York reported defoliation: 111 ha were lightly defoliated. (The area defoliated has not been included in table 1 because values in the table are rounded off to the nearest thousand.)

Lake States--Budworm populations are on the decline in the Upper Peninsula of Michigan and remain static in Minnesota and Wisconsin. In Michigan, 75,000 ha were defoliated, and populations are expected to decline to endemic levels within the next few years. In Minnesota,

124,000 ha were defoliated, with 105,000 ha showing moderate to severe defoliation. These figures are 15 percent lower than last year's; further declines are expected, even though populations in the extreme northeast will probably continue at high levels. In Wisconsin, 6,110 ha were severely defoliated.

In 1985, the Michigan Department of Natural Resources treated about 800 ha in the Upper Peninsula with Bt. Unacceptable tree mortality would have occurred in these 66 stands had they not been treated.

Western Canada

In British Columbia, western spruce budworm (Choristoneura occidentalis (Freeman)) defoliated 210,350 ha of Douglas-fir, mainly in the Kamloops Region. In 1984, only 62,000 ha were defoliated.

The 2-year-cycle budworm (Choristoneura biennis Freeman) and a 1-year-cycle budworm (C. orae Freeman) caused light to moderate defoliation of alpine fir and spruce over 6,550 ha in parts of the Cariboo and Prince George Regions.

No large-scale suppression projects were conducted in Western Canada.

Western United States

Budworm activity increased or remained at high levels throughout the Western United States.

Northern Region--The area of Douglas-fir and true firs defoliated in Montana and northern Idaho increased from 938,000 ha in 1984 to 1.1 million ha in 1985. In fact, 1985 was the fourth

consecutive year in which defoliation topped 900,000 ha. Mortality occurred on 44,000 ha.

In Montana, where the most persistent outbreaks occur, the area defoliated increased by almost 180,000 ha. Notable increases occurred on the Flathead National Forest and adjacent Flathead Indian Reservation lands, where the area defoliated increased from 708 ha in 1984 to 1,700 ha in 1985. On the Helena National Forest, the area defoliated increased from 234,000 to 307,000 ha; on the Bureau of Land Management lands east of Missoula, the area defoliated increased from 9,000 to 75,000 ha.

After several years of no visible defoliation, budworm populations increased in northern Idaho. The Nezperce National Forest reported 185 ha defoliated in 1984, 805 ha in 1985--and further increases are likely.

Rocky Mountain Region--Defoliation in Colorado and eastern Wyoming decreased to 643,000 ha in 1985.

In Colorado, private landowners in mountain communities along the Front Range treated 4,000 ha with Bt and carbaryl.

Southwestern Region--The western spruce budworm defoliated Douglas-fir, true firs, and spruce on 186,000 ha in Arizona and New Mexico.

In northern New Mexico, defoliation was extensive on the Carson, Santa Fe, and Cibola National Forests and adjoining lands, including the Taos Pueblo Indian Reservation. In Arizona, isolated pockets of infestation were detected on the Apache-Sitgreaves National Forest.

In New Mexico during May and June 1985, a western spruce budworm suppression project was

conducted on selected portions of the Carson National Forest and nearby private lands. A total of 10,352 ha of infested host type was aerially treated with Bt. In addition, 11 campgrounds were treated with ground applications of Bt.

Intermountain Region--Throughout the area, Douglas-fir, grand fir, and alpine fir were defoliated on approximately 1.1 million ha, a 30-percent increase over 1984. Budworm activity increased in southern Idaho and western Wyoming. Both the area and intensity of defoliation increased on the Boise, Caribou, Challis, Payette, and Sawtooth National Forests in Idaho and on the Bridger-Teton National Forest in Wyoming.

In Utah, on the other hand, a decrease in intensity of defoliation occurred on the Dixie-Fishlake and Manti-LaSal National Forests.

Pacific Southwest Region--The budworm species Choristoneura carnana californica Powell continued to damage Douglas-fir on approximately 53,000 ha in Trinity and Shasta Counties in California; however, most defoliation was light.

The Modoc budworm (Choristoneura retiniana (Walsingham)) defoliated white fir on 20,000 ha in Modoc County at elevations between 900 to 1,600 m.

In May 1985, the California Department of Forestry cooperated with the Shasta-Trinity National Forest and private landowners in treating approximately 36,000 ha with Bt. Harvest plans call for early salvage of treated areas to reduce loss.

Pacific Northwest Region--For the third year, defoliation increased in Oregon and Washington. Defoliation by the western spruce budworm and Modoc budworm covered 1.6 million ha.

In Oregon east of the Cascade Mountains, budworm defoliation increased on the Mt. Hood and Deschutes National Forests and the Warm Springs Indian Reservation. In central and northeast Oregon, budworm defoliation increased slightly. In south-central Oregon, the area defoliated by the Modoc budworm increased to 201,360 ha on the Winema and Fremont National Forests.

In Washington, the area defoliated increased from 21,000 ha in 1984 to 168,000 ha in 1985. Most of the defoliation occurred on the Okanogan and Wenatchee National Forests and adjoining State and private lands.

In Oregon, the Forest Service treated approximately 17,000 ha on the Malheur National Forest with Bt. They applied Bt with helicopter and fixed-wing aircraft to determine optimum swath width. They also compared diluted with undiluted material to see if both were equally effective.

Alaska Region--No damage was visible during the 1985 aerial survey, although budworm feeding was observed in ground surveys conducted in the Kenny Lake area.

Outlook for 1986

In Eastern Canada, defoliation is expected to be quite variable in 1986. In Newfoundland, it is predicted on 7,500 ha; in New Brunswick, moderate to severe defoliation is predicted on 3.15 million ha. In Quebec and Ontario, however, overall decreases are predicted.

In the Eastern United States, budworm populations in Maine, New Hampshire, and Vermont declined for the second straight year and are expected to continue to decline. The populations reported in New York are expected to continue at the same low levels. As pheromone-baited traps improve monitoring techniques, ultra-low populations will become detectable.

In the Lake States, populations are expected to continue to decline in the Upper Peninsula of Michigan and to remain static in Minnesota and Wisconsin. The use of pheromone traps will increase in Minnesota and Wisconsin, further delineating low population levels in the area. Two areas in Minnesota (Cook County, south of Gunflint Lake and north of Brule Lake) suffered heavy defoliation in 1985. Topkill was noticed in the area, and mortality is expected to occur in some stands. Widespread losses due to topkill and mortality are expected to continue in St. Louis County. In the northeastern part of the outbreak, populations are expected to remain at high levels.

In Western Canada, the defoliation in British Columbia is expected to be light to moderate. Defoliation in 1986 is expected to be more widespread in the Cariboo and Prince George Regions because of the 2-year-cycle budworm.

In the Western United States, outbreaks are expected to continue in Montana, Wyoming, Idaho, Washington, and Oregon; defoliation will decline in Colorado and Utah. In California, defoliation near Clair Engle Lake in Trinity County is expected to remain light. Trees stressed by the 1984 outbreak will continue to recover.

Table 1--Area defoliated by the spruce budworms (Choristoneura spp.) in North America, 1984 and 1985

Province, State, or Forest Service Region	1984	1985	Trend
	1,000 hectares		
Newfoundland	15	4	11-
Nova Scotia	85	345	260+
Prince Edward Island	15	70	55+
New Brunswick	730*	1,070	340+
Quebec	11,040	9,270	1,770-
Ontario	8,748	12,332	3,584+
Prairie Provinces	170	106	64-
Maine	2,228	1,944	284-
New Hampshire	<1	0	1-
Vermont	0	0	0
Michigan	78	75	3-
Minnesota	147	124	23-
Wisconsin	9	6	3-
British Columbia	74	217	143+
Northern Region	900	1,100	200+
Rocky Mountain Region	888	643	245-
Southwestern Region	280	186	94-
Intermountain Region	950	1,133	183+
Pacific Southwest Region	53	73	20+
Pacific Northwest Region	1,385	1,620	235+
Alaska Region	0	0	0
Total	27,796	30,318	2,522+

Note: - = decrease in defoliation; + = increase.

* In 1984, defoliation reported as 11.2 million ha.

Figure 1--Defoliation by spruce budworms

Table 2--Area treated for spruce budworms (*Choristoneura* spp.) in North America, 1985

Province, State, or Forest Service Region	Area treated	Insecticide
	1,000 hectares	
Eastern Canada		
Newfoundland	3	Bt
Nova Scotia	53	Bt
New Brunswick	452	aminocarb
	168	fenitrothion
	81	Bt
Quebec	481	Bt
	184	fenitrothion
Ontario	29	Bt
Eastern United States		
Maine	138	Bt
	32	mexacarbate
	69	aminocarb
Michigan	1	Bt
Western United States		
Rocky Mountain Region	4	Bt, carbaryl
Southwestern Region	10	Bt
Pacific Southwest Region	36	Bt
Pacific Northwest Region	17	Bt

Figure 2--Areas treated for spruce budworms

Acknowledgments

The Canadian information was provided by Newfoundland, Nova Scotia, Prince Edward Island, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia. The Forest Insect and Disease Survey, Canadian Forestry Service also provided data. All the information was coordinated by the Forest Insect and Disease Survey, in particular Edward George Kettela, Maritimes Forest Research Centre, Canadian Forestry Service.

The U.S. information was provided by Maine, New Hampshire, Vermont, Wisconsin, Minnesota, and Michigan and by USDA Forest Service Regions 1 through 6 and 10 and the Northeastern Area State and Private Forestry field offices in St. Paul, MN, and Durham, NH.

When you know	Multiply by	To find
meters	3.281	feet
hectares	2.471	acres
cubic meters	35.31	cubic feet

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This publication reports the use of insecticides in both Canada and the United States. It does not contain recommendations for their use. All uses of pesticides must be registered by appropriate Canadian or U.S. agencies before they can be recommended for use in either country.

CAUTION: Pesticides can be injurious to human beings; animals; desirable plants, fish, or wildlife if they are not handled or applied properly. Use all pesticides selectively and carefully. Follow recommended practices for the disposal of surplus pesticides and pesticide containers.